P/4169-7

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Akio OKAMIYA, et al.
Serial No.: 10/656,648
Filed: September 4, 2003
For: OIL REPELLING AGENT

Date: November 25, 2003
Group Art Unit:
Examiner:

Mail Stop Petition
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

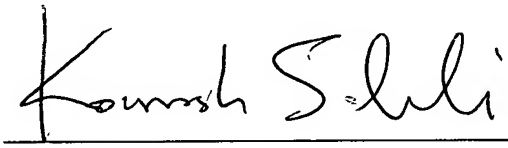
SUPPLEMENT TO THE PETITION TO MAKE SPECIAL PURSUANT TO
37 C.F.R. §1.102(d) and MPEP § 708.02 VIII

Sir:

Further to our Petition to Make Special dated October 24, 2003 and the Declaration attached thereto, we are herewith enclosing a translation of Japanese Publication No. 2001-027242.

Japanese Publication No. 2001-027242 is included in the pending Petition to Make Special.

Respectfully submitted,



Kourosh Salehi
Registration No.: 43,898
OSTROLENK, FABER, GERB & SOFFEN, LLP
1180 Avenue of the Americas
New York, New York 10036-8403
Telephone: (212) 382-0700

KS:gl
Enclosure

OFGS File: P/4169-7

(12) Kokai (Laid Open) Patent Koho (Publication) (A)
(19) Office of Patents, Government of Japan (JP)
(11) Patent Application Kokai No. Toku Kai 2001-27242 (P2001-27242A)
(43) Kokai Date: January 30, 2001 (2001.1.30)
--
(51) Int. Cl.^{7} F 16 C 33/10, 17/10
Discrimination Code: Fl

	Theme Code (Ref.)
F 16 C 33/10	Z 3 J 011
17/10	A

Request for Examination: Not filed as yet.
Number of Claims: Three OL (Total Number of Pages - Six)
--
(21) Application Number: Toku Gan Hei 11-201170
(22) Application Date: July 15, 1999 (1999.7.15)
--
(71) Applicant: 000002233 Sankyo Seiki Seisakusho Company, Limited
5329 Shimo Suwa Machi, Suwa Gun, Nagano Ken
(72) Inventor: Kazushi Miura, c/o Sankyo Seiki Seisakusho Company, Limited, 5329 Shimo Suwa Machi, Suwa Gun, Nagano Ken
(72) Inventor: Masato Gomei, c/o Sankyo Seiki Seisakusho Company, Limited, 5329 Shimo Suwa Machi, Suwa Gun, Nagano Ken
(74) Agent 100093034 Takahide Goto, Patent Attorney
F Term (Reference) 3 J 011 AA 04 BA 02 BA 09 CA 02 CA 05
JA 02 KA 04 MA 12
--
(54) (Title of the Invention) A Dynamic Pressure Bearing Device

(57) (Summary)
(Theme)
To make it possible to drastically improve the productivity of dynamic pressure bearing devices by a simple construction.

(Means for Solution)

By causing the oil-repellent agent that has been applied to the required members which are located outside of the device as compared with the dynamic pressure bearing parts RBa, RBb, SBa and SBb to contain a coloring agent or a fluorescent agent, it makes it possible for the observer to immediately recognize the coated state of the oil-repellent agent by means of the visually recognizable function of said coloring agent or fluorescent agent, thereby making it possible to carry out the inspection or confirmation of the presence or absence of the oil-repellent agent and the range of its coating.

(Insert Figure on Cover Page. a. Oil. b. Air.)

(Scope of Claims for Patent)

(Claim 1) A dynamic pressure bearing device wherein there is provided a dynamic pressure bearing part which is constituted by injecting lubricating oil into the gap between an axial member and a bearing member that is mounted with a narrow gap from said axial member, with said axial member and bearing member being supported mutually rotatably as the lubricating oil inside its dynamic pressure bearing part is pressurized by a dynamic pressure generating means, characterized in that an oil-repellent agent is applied to the surfaces of those members which are located outside of the device as compared with said dynamic pressure bearing part and that said oil-repellent agent contains a coloring agent or a fluorescent agent.

(Claim 2) A dynamic pressure bearing device of the axially fixed type, where there are a fixed axis that has been fixed to the frame and a rotary bearing that has been mounted with a prescribed gap from this fixed axis, provided with a dynamic pressure bearing part where a lubricating oil has been injected between said fixed axis and said rotary bearing, and the rotary bearing is rotatably supported as compared with said fixed axis as said lubricating oil is pressurized due to the dynamic pressure

generating means that is provided at its dynamic pressure bearing part, characterized in that the surfaces of various members including the sealed part of said dynamic pressure bearing part, the injection part of the lubricating oil and the injection and sealing part of the lubricating oil which are located outside of the device as compared with the lubricating oil holding part of said dynamic pressure bearing part and said dynamic pressure bearing part are coated with an oil-repellent agent and that said oil-repellent agent contains either a coloring agent or a fluorescent agent.

(Claim 3) A dynamic pressure bearing device as described in Claim 2, wherein the injection part of said lubricating oil and the injection sealing part of the lubricating oil are equivalent to both ends of said fixed axis, the injection part of said lubricating oil contains one terminal face in the axial direction of said fixed axis and its vicinity, the inner wall surfaces of the fixing screw holes that have been formed from one terminal face side of said fixed axis and the injection passageways of the lubricating oil and a terminal face in the axial direction of said rotary bearing, characterized in that the injection sealing part of said lubricating oil contains the other terminal face in the axial direction of said fixed axis and its vicinity and the inner wall surfaces of the fixing screw hole that has been formed on the other terminal side of said fixed axis.

(Detailed Explanation of the Invention)

(0001)

(Technical Field to Which This Invention Belongs)

This invention relates to a dynamic pressure bearing

device that supports the axis member and bearing member in such a fashion as to engage in relative rotation by means of the dynamic pressure of the lubricating oil.

(0002)

(Conventional Technology)

Various proposals have been made in recent years concerning the dynamic pressure bearing devices which are used for the high-speed rotation of various kinds of rotors for the magnetic discs, polygon mirrors, and optical discs, and so forth. According to such dynamic pressure bearing devices, the dynamic pressure surface of the axial member and the dynamic pressure surface of the bearing member (bearing sleeve) side are made to face each other against the radius direction or the axial direction via a prescribed small gap, with a dynamic pressure bearing part being formed between the opposing gaps.

In addition, such a liquid pressurizing means as a groove for the generation of the dynamic pressure, etc. is formed at least on one side of said opposing dynamic pressure surfaces, with a consequence that the air or oil that has been injected into said dynamic pressure bearing part as a lubricating fluid is pressurized by the bumping action of said fluid pressuring means at the time of the rotation. Because of this, both the axial member and the bearing member are rotatably supported in a relative state of being afloat by the dynamic pressure of the lubricating fluid that has been produced thereby.

(0003)

In the case of those dynamic pressure devices which employ a lubricating oil as a lubricating fluid, if the lubricating oil adheres to the members that are located outside of the device of the dynamic pressure bearing part, said adhered lubricating oil tends to smear the interior of the device as it rotates and scatters around, thereby making it impossible to be used in those devices which are required to strictly control the smearing as in the case of the hard disc driving devices (HDD) and so forth. As a result of this, it has often been the case that the oil-repellent agent is applied to the surface areas outside the device as compared with the dynamic pressure bearing.

(0004)

Said oil-repellent agent contains a resin of the fluorine system. As it is applied to the necessary parts like the shafts, hubs, bearing sleeves, and so forth, the lubricating oil that has adhered thereto is globularized, thereby making it easier to wipe them out and preventing any further scattering of wetting. It also has the function of preventing the wet spreading of the lubricating oil from the dynamic pressure bearing part.

(0005)

(Problem To Be Solved By The Invention)

Nevertheless, said oil-repellent agent is ordinarily colorless and transparent, thereby making it difficult to see if coating has been carried out or not. Even if it may be certain that coating has been carried out, it is noteasy to detect the range of such

coating. Because of this, a substantially long period of time is spent on the inspection and confirmation of the oil-repellent agent that has been applied, thereby contributing toward the lowering of the productivity.

(0006)

Accordingly, the objective of this invention lies in offering a dynamic pressure bearing device which has been made possible to easily detect the state of the coating of the oil-repellent agent.

(0007)

(Means For Solving The Problem)

For the purpose of achieving said objective, the invention according to Claim 1 offers a dynamic pressure bearing device wherein there is provided a dynamic pressure bearing part which is constituted by injecting a lubricating oil into the gap between an axial member and a bearing member that is mounted with a narrow gap from said axial member, with said axial member and bearing member being supported mutually rotatably as the lubricating oil inside its dynamic pressure bearing part is pressurized by a dynamic pressure generating means, characterized in that an oil-repellent agent is applied to the surfaces of those members which are located outside of the device as compared with said dynamic pressure bearing part and that said oil-repellent agent contains a coloring agent or a fluorescent agent.

(0008)

The invention according to Claim 2 offers a dynamic pressure bearing device of the axially fixed

type, where there are a fixed axis that has been fixed to the frame and a rotary bearing that has been mounted with a prescribed gap from this fixed axis, provided with a dynamic pressure bearing part where a lubricating oil has been injected between said fixed axis and rotary bearing, and the rotary bearing is rotatably supported as compared with said fixed axis as said lubricating oil is pressurized by the dynamic pressure generating means that is provided at its dynamic pressure bearing part, characterized in that the surfaces of various members including the sealed part of said dynamic pressure bearing part, the injection part of the lubricating oil and the injection and sealing part of the lubricating oil which are located outside of the device as compared with the lubricating oil holding part of said dynamic pressure bearing part and said dynamic pressure bearing part are coated with an oil-repellent agent and that said oil-repellent agent contains either a coloring agent or a fluorescent agent.

(0009)

Moreover, the invention which is described in Claim 3 wherein the injection part of said lubricating oil and the injection sealing part of the lubricating oil as described in said Claim 2 correspond to both ends of said fixed axis offers a dynamic pressure bearing device wherein the injection part of said lubricating oil contains one terminal face in the axial direction of said fixed axis and its vicinity, the inner wall surfaces of the fixed screw holes that have been formed from one terminal face side of

said fixed axis and the injection passageway of the lubricating oil and a terminal face in the axial direction of said rotary bearing, characterized in that the injection sealing part of said lubricating oil contains the other terminal face in the axial direction of said fixed axis and its vicinity and the inner wall surface of the fixed screw hole that has been formed on the other terminal side of said fixed axis.

(0010)

According to this invention which has been described above, the state of the coating of the oil-repellent agent can be recognized immediately by the observer due to a visual discrimination function of the coloring agent or the fluorescent agent that is contained in the oil-repellent agent.

(0011)

(Forms Of The Application Of Invention)

At first, let us explain the over-all structure of an HDD spindle motor of the axially fixed type as is shown in Figure 1 as an example of the device that is equipped with a dynamic pressure bearing device according to this invention.

(0012)

The entirety of an HDD spindle motor which is shown in Figure 1 comprises a stator set 10 as a fixed member and a rotor set 20 as a rotary member which is arranged from above as compared with the stator set 10. Of these, the stator set 10 has a frame 11 as a bearing support frame that is to be screwed to the fixing stand which is not shown in the drawing and, at

the same time,a hollow and cylindrically shaped core holder 12 is erected approximately at the center of the frame 11 in an integral fashion.

(0013)

A stator core 14 is encased into the surface of the outer wall of said core holder 12 and a coil 15 is wound on each protuberant part of said stator core 14.

(0014)

Meanwhile, a fixed axis 13 is fixed approximately at the center of said frame 11 in such a manner as to protrude upward. This fixed shaft 13 is formed with a material such as stainless steel (SUS 420 J 2), for example. Both ends of said fixed shaft 13, as shown at the top and the bottom, are screwed into the side of the fixed stand which is not shown in the drawing by using female screw tap holes 13a and 13b that are provided at both ends.

(0015)

On the outer peripheral side of said fixed shaft 13, a hub 21 is freely totatably mounted via a bearing sleeve 22 as a bearing member constituting said rotor set 20. On said rotor set 20, in other words, a hub 21 whose purpose it is to support a prescribed recording medium which is not shown in the drawing is inserted to the outer peripheral side of the bearing sleeve 22.

Said hub 21 has a trunk part 21a which is approximately in the shape of a cylinder for mounting such a magnetic recording medium as the magnetic disk, etc. and a driving magnet 21c is provided annularly via a back yoke 21b on the inner peripheral wall of the trunk 21a. This driving magnet 21c is arranged

in close proximity to the outer peripheral terminal surface of each protuberant part of the stator core 14 as described earlier in such a fashion as to face same in an annular fashion.

(0016)

On the inside wall of the hole at the center of said bearing sleeve 22, a set of bearing protrusions 23 and 23 are formed in the axial direction at a prescribed distance from each other. These bearing protrusions 23 and 23 are arranged to face each other in such a manner as to approach the outer peripheral surface of said fixed shaft 13.

A neighboring set of radial dynamic pressure bearing parts RBa and RBb are provided in parallel with the axial direction by means of the dynamic pressure surfaces which are provided on the inner peripheral surfaces of the bearing protrusion parts 23 and 23 and the dynamic pressure surface that has been formed on the outer peripheral surface of said fixed axis 13. Because of said set of radial dynamic pressure bearing parts RBa and RBb, said hub 21 is supported in such manner as to become freely rotatable in the radial direction.

(0017)

At each radial dynamic pressure bearing part RBa or RBb mentioned above, the dynamic pressure surface on the bearing sleeve 22 side and the dynamic pressure surface on the fixed axis 13 side are arranged to face each other in a circumstantial way via a narrow gap of several (mu)m so that the bearing spaces consisting of a set of narrow gaps at a prescribed distance in the axial direction may continue. Inside each bearing space, the lubricating oil is independently injected and an air layer which is linked

with the atmosphere exists in an expanded space B that has made the gap part between both dynamic pressure bearing parts RBa and RBb hollow toward the exterior in the radius direction.

(0018)

Moreover, on the dynamic pressure surface at least on said bearing sleeve 22 side of said pair of dynamic pressure surfaces, a pair of radial dynamic pressure generating grooves that form a herring bone shape (which is not shown in the drawing) are arranged in such a fashion that they would be made annularly. At the time when said hub 21 rotates, the lubricating oil is pressurized, with its pressure elevated, and a dynamic pressure is produced by the bumping action of these radial dynamic pressure generating grooves and, because of the dynamic pressure that has been produced in said lubricating oil, the hub 21 is axially supported in the radial direction.

(0019)

On both end sides in the axial direction of the bearing space that constitute the radial dynamic pressure bearing parts RBa and RBb, capillary tube sealing parts as a lubricating oil holding part are provided in such a fashion as to sandwich each of the radial dynamic pressure bearing parts RBa and RBb from both sides of the axial direction.

Each of these capillary tube sealing parts is produced by gradually expanding the gap between said bearing sleeve 22 and said fixed axis 13 toward the outside of the bearing by means of an inclined surface

that has been formed on the bearing sleeve 22 side. When the motor is rotating or when it is at a stand-still position, it is so stipulated that the surface of the lubricating oil may be at a prescribed position inside each of the capillary tube sealing part.

(0020)

On the tip side of said fixed axis 13 (see the upper side shown in the drawing), moreover, a disc-shaped thrust plate 16 is fixed. This thrust plate 16 is arranged in such a manner that it may be accommodated inside a cylindrically shaped concave part that has been provided at the center in the upper part of the drawing of the bearing sleeve 22 mentioned above. As the dynamic pressure surface shown in the lower part of the figure indicating said thrust plate 16 is arranged in the axial direction in close proximity to the dynamic pressure surface that is provided on the bottom wall of the concave part of said bearing sleeve 22, the thrust dynamic pressure bearing part SBa on the lower side is constituted.

(0021)

A counter plate 24 consisting of a large disc-shaped member is installed, with its center in a manner of extending, so as to approach the dynamic pressure surface on the upper side in the drawing of said thrust plate 16. The upper side thrust dynamic pressure bearing part SBb is constituted by the dynamic pressure surface that has been provided on the lower surface side of this counter plate 24 and the dynamic pressure surface that has been provided on the upper surface side in the drawing

of said thurst plate 16.

(0022)

In each of the set of thrust dynamic pressure bearing parts SBa and SBb which have been arranged side by side, each dynamic pressure surface on the bearing sleeve 22 and counter plate 24 sides and both of the dynamic pressure surfaces on the terminal faces in the axial direction of the thrust plate 16 are arranged to face each other in the axial direction through a narrow gap of several (mu)m and lubricating oil (oil) is independently injected into each bearing space consisting of a set of narrow gaps that have been arranged at a prescribed distance through an outer peripheral side passage of said thrust plate 16.

(0023)

In the form of this example, moreover, thrust dynamic pressure generating grooves in the shape of herring bones (which are not shown in the drawing) are arranged annularly in parallel as compared with each dynamic pressure surface that has been provided on both terminal surfaces in the axial direction of said thrust plate 16. At the time when said hub 21 rotates, the lubricating oil produces dynamic pressure as it is pressurized and its pressure elevated, with the hub 21 being axially supported in the thrust direction by the dynamic pressure that has been produced in this lubricating oil.

(0024)

On both terminal sides in the radius direction of the bearing space that constitutes a set of thrust dynamic pressure bearing parts SBa and SBb mentioned

above, capillary sealing parts are provided in such a fashion as to sandwich the thrust dynamic pressure bearing parts SBa and SBb from both sides in the radius direction. Each of these capillary tube seal parts is made by gradually expanding the gap between said thrust plate 16 and said bearing sleeve 22 outwardly. The capillary tube sealing part that has been arranged on the inner side in the radius direction is linked to the atmosphere on said radial dynamic pressure bearing part RBa and outside of the motor. Irrespective of whether the motor is in rotation or at standstill, the surface position of the lubricating oil is set at a prescribed location in each capillary tube sealing part.

(0025)

On said counter plate 24, moreover, there is provided a cover plate 26 in the form of a thin sheet via an absorption cloth 25 from outside (top side in the drawing). Because of the absorptive cloth 25 and the cover plate 26, the possible scattering of the lubricating oil outside is prevented even in the worst case.

Even for the outer portion of the radial dynamic pressure bearing part RBb on the lower side in the drawing, a thin sheet-like cover plate 26 is provided via a similar absorptive cloth 25 and, bacause of said absorptive cloth 25 and covering plate 26, the possible scattering of the lubricating oil outside is prevented even in the worst case.

(0026)

The necessary parts corresponding to the exterior of the device as compared with each of the dynamic pressure bearing parts RBa and RBb mentioned above are coated with an oil repellent agent for the purpose of preventing the possible spread of wetting by the lubricating oil that has adhered to them or to the bearing part and facilitating the wipe-out cleaning operation.

The details of the coating positions of said oil-repellent agent will be given later. However, said oil repellent agent is prepared by dissolving a resin of the fluorine system into a volatile solvent. By coating the surface with a resin of the fluorine system in the volatile agent that is applied, the free energy on the surface is made extremely low. As a consequence of this, it becomes difficult to be wetted by a fluid whose cohesive force is large such as the lubricating oil and the lubricating oil that has stuck to some part can be globularized.

The HFC (hydrochlorocarbons), for example, are employed as the solvents which are volatile as mentioned above. At those parts which have been coated with such an oil-repellent agent, a baking treatment (heating treatment) is carried out for the purpose of improving its oil-repellent function.

(0027)

In view of the fact that said oil-repellent agent lacks a capacity of easy recognition as it is colorless and transparent, a coloring agent or a fluorescent agent is contained in the oil-repellent agent as described above in the form of this example, thereby

making it possible for the parts that have been coated with the oil repellent agent to be visually recognized immediately. As such coloring agents, pigments of the anthraquinone system are employed. As the fluorescent agents, those of the cumarine system, etc. are used.

(0028)

As described above, the oil repellent agent is applied to those necessary parts on the exterior side of the device as compared with the dynamic pressure bearing part. Those necessary parts include the injection part of the lubricating oil and its injection and sealing parts in addition to the sealing part of each dynamic pressure bearing part.

The injection part and the injection sealing part of the lubricating oil will be explained below:

(0029)

The injection of the lubricating oil into each of said dynamic pressure bearing parts RBa, RBb, SBa and SBb is carried out in the manner shown in Figure 2, to cite an example. In other words, the fixed axis 13 where a thrust plate 16 is installed is put in the state of being mounted on said rotor set 20 and the injection nozzle 41 of the oil injection apparatus and the oil sealing device 42 are air-tightly linked via O rings 41a and 42a to each of the terminal parts in the axial direction of said fixed shaft 13. As a result of this, the bearing spaces including all of the dynamic pressure bearing parts RBa, RBb, SBa and SBb will be arranged inside a sealed space.

The air inside said tightly sealed space is once

extracted by means of an injection nozzle 41 of said oil injection equipment, thereby bringing about a vacuum state. Next, a lubricating oil injection passage 13c that has been formed on the fixed shaft 13 in such a fashion as to extend from the female tap hole 13a on the lower side of the drawing in the axial direction is used for supplying the lubricating oil from said injection nozzle. As a consequence, the sealed spaces including the dynamic pressure bearing parts RBa, RBb, SBa and SBb are filled with the lubricating oil.

(0030)

In the result of the adhesion of the lubricating oil as described above, the parts which are indicated by a wavy line in the drawing and are coated with the lubricating oil including the lower terminal face of said fixed shaft 13, the inner walls of the female screw tap hole 13a that has been formed on said fixed shaft 13 and the lubricating oil passageway 13c, the lower terminal face of the bearing sleeve 22 as well as the upper terminal face in the drawing of said fixed shaft 13 and its vicinity and the inner wall of the female screw tap hole 13b are coated with the said oil repellent agent.

(0031)

In addition, said oil repellent agent is also applied to that part where said absorptive cloth 25 is mounted. In the case of said counter plate 24, the cover plate 26 and the bearing sleeve 22, those surfaces which directly touch said absorptive cloth

25 are coated with the oil repellent agent as mentioned above.

(0032)

According to the form of this example which has been described above, the state of the coating of the oil repellent agent is immediately recognized by the observer, thanks to the visually recognizable function of the coloring agent or fluorescent agent that is contained in the oil repellent agent. As a result of this, the inspection and confirmation of either the presence or absence of the coating of an oil-repellent agent and the range of its coating can be carried out in an extremely efficient manner.

(0033)

The forms of the application of the invention that has been carried out by the present inventors have been explained in specific terms. However, this invention is not to be limited to the said forms of the application. It goes without saying that it can be varied without deviating from the essence of this invention.

For example, this invention is not to be limited to a dynamic pressure bearing device of the fixed axis type as described in the form of an application mentioned above. A similar effect and function can be achieved when a similar oil-repellent agent is applied to those locations where a lubricating oil tends to adhere in the oil injection step of a dynamic pressure bearing device of the axial rotation type.

(0034)

As is shown in Figure 3, a rotary shaft 63 where

a thrust plate 66 has been installed is set in a state where a stator set 50 has been mounted and the injection nozzle 41 of the oil injection equipment is air-tightly linked through an O ring 41a to the protuberant part in the axial direction (upper part in the drawing) of said rotary shaft 63. As a consequence of this, a bag-shaped dynamic pressure bearing space will be air-tightly linked to said injection nozzle 41. As the air inside the dynamic pressure bearing space that is in the shape of a bag is once extracted by means of an injection nozzle 41, thereby bringing about a vacuum state, followed thereafter by a supply of the lubricating oil from the same injection nozzle 41, the lubricating oil is injected into the bag-shaped dynamic pressure bearing space.

(0035)

The areas which are indicated by a wave line in the drawing where the lubricating oil adheres in an injection step of the lubricating oil as described above including that part which protrudes from the bearing sleeve 52 of said rotary shaft 63 and the upper terminal face of the bearing sleeve 52 are coated with the lubricating oil similar to the form of application as described above. In the form of this application, too, an effect and function similar to those obtained in said form of application can be obtained.

(0036)

Moreover, this invention can similarly be used for the dynamic pressure bearing equipment other than

said motor. For example, it can similarly be used for the dynamic pressure bearing devices which are used in the motor for polygon mirror driving or the motor for CD-ROM driving.

(0037)

(Effect of the Invention)

This invention which has been described above makes it possible for an observer to immediately recognize the status of the coating of an oil-repellent agent by the visually recognizable function of said coloring agent or fluorescent agent by causing the coloring agent or fluorescent agent to be contained in the oil repellent agent which has been applied to the necessary members which are located outside of the device as compared with the dynamic pressure bearing part.

Accordingly, the inspection and confirmation action of the presence or absence of the coating of the oil-repellent agent and the range of such coating can be carried out extremely efficiently and a simple construction makes it possible to drastically improve the productivity of the dynamic pressure bearing devices.

(Concise Explanation of the Drawings)

(Figure 1) This is a cross-sectional explanation showing an example of the total structure of a hard-disc driving device (HDD) which is provided with a dynamic pressure bearing device of the axially fixed type in the form of an example of this invention.

(Figure 2) This is a cross-sectional explanation

showing a step for the injection of a lubricating oil in a dynamic pressure bearing device as is shown in Figure 1.

(Figure 3) This is a cross-sectional explanation showing a step for the injection of a lubricating oil in a dynamic pressure bearing device of the axially rotation type.

(Explanation of the Codes)

10. Stator set
13. Fixed shaft
13a, and 13b. Female screw tap holes
13c. Lubricating oil injection passage
16. Thrust plate
20. Rotor set
22. Bearing sleeve
21. Hub
24. Counter plate
25. Absorptive cloth
26. Cover plate
RBa, RBb. Radial dynamic pressure bearing parts
SBa, SBb. Thrust dynamic pressure bearing parts
41. Injection nozzle of the oil injection device
42. Oil sealing device
41a, 42a. O rings

--

(Insert Figure 1 on p. (6).)
(Insert Figure 2 on p. (6). a. Oil. b. Air.)
(Insert Figure 3 on p. (6). a. Oil. b. Air.)